Harewood Community Centre
Detailed Engineering Evaluation
BU 0299-001 EQ2
Quantitative Report

Prepared for Christchurch City Council (CCC)

By Beca Carter Hollings & Ferner Ltd (Beca)

19 December 2012

Revision History

Revision Nº	Prepared By	Description	Date
A	Vini Moelianto	Draft for CCC review	11 December 2012
B	Vini Moelianto	FINAL	19 December 2012

Document Acceptance

Action	Name	Signed	Date
Prepared by	Vini Moelianto		11 December 2012
Reviewed by	Jonathan Barnett		11 December 2012
Approved by	David Whittaker		11 December 2012
on behalf of	Beca Carter Hollings & Ferner Ltd		

Harewood Community Centre
BU 0299-001 EQ2

Detailed Engineering Evaluation
Quantitative Report – SUMMARY
Version 1

Address
709 Harewood Road
Harewood
Christchurch

Background

This is a summary of the Quantitative Assessment report for the building structure, and is based on the document 'Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury – Part 2 Evaluation Procedure' (draft) issued by the Engineering Advisory Group (EAG) on 19 July 2011.

The Harewood Community Centre is located at 709 Harewood Road, Harewood, Christchurch. The original construction date is unknown. Partial architectural drawings of various refurbishments reviewed during our assessment include installing a new ceiling in 1970, new toilet block at the rear of the site (which was later demolished around 1996) and removal and replacement of the original timber match wall lining with plasterboard lining. There have potentially been other refurbishments to the building for which no documentation is available. The building is a timber structure with an approximate floor area of 195 m^2 internally. Limited wall bracing calculations have been undertaken as part of the Quantitative Assessment. A Qualitative assessment has not been carried out on this building.

Key Damage Observed

Visual inspections on 26 September 2012 indicate the building has suffered relatively minor damage to the structure. The key damage observed includes:

- Cracking and spalling to foundation wall potentially due to ground movement during the earthquake.
- Cracking to plasterboard lining with minor leaking stains at the southern side of the building.

Critical Structural Weaknesses (CSW)

- Lack of lateral resistance in the transverse direction with limited load paths on the large hall area to transfer lateral loads to the foundations.

Indicative Building Strength (from Initial Evaluation Procedure and CSW assessment)

The building has been assessed to have a seismic capacity of 6%NBS using the New Zealand Society for Earthquake Engineering (NZSEE) Detailed Assessment guideline 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006, and is therefore classified as Earthquake Prone and Seismic Grade E.

The structural damage observed is predominantly minor and the seismic capacity is not considered to have materially diminished from its pre-earthquake condition.

Recommendations

In order that the owner can make an informed decision about the on-going use and occupancy of their building the following information is presented in line with the Department of Building and Housing document 'Guidance for engineers assessing the seismic performance of non-residential and multi-unit residential buildings in greater Christchurch', June 2012.

The building is considered to be earthquake prone, having an assessed capacity less than 33%NBS. The risk of collapse of an earthquake prone building of this grade is considered to be more than 25 times greater than that of an equivalent new building.

For greater Christchurch the definition of "dangerous" building in the Building Act has been extended (by the Canterbury Earthquake (Building Act) Order 2011) to include buildings at risk of collapsing in a moderate earthquake, that is earthquake prone buildings with a capacity at or below 33%NBS. Where council requires a dangerous building or an earthquake prone building to be upgraded, it may prohibit the use of the building until the works are carried out.

No significant damage or hazards were identified to the seismic or gravity load resisting system that would further reduce its ability to resist further loads.

It is recommended that:

- Further efforts are made to obtain structural drawings.
- A level survey could be carried out to determine the extent of settlement of the building for insurance purposes.
- The assessment is based on some significant assumptions; further investigations are required to confirm capacity.
- Repairs that would bring the building back to an "as new" condition are typically entitled under typical replacement insurance policies. We suggest you consult with your insurance advisor as to how you wish to proceed.

Table of Contents

Appendices

1 Background

Beca Carter Hollings & Ferner Ltd (Beca) has been engaged by the Christchurch City Council (CCC) to undertake a Quantitative Detailed Engineering Evaluation (DEE) of the Harewood Community Centre building located at 709 Harewood Road, Harewood, Christchurch.

This report is a Quantitative Assessment of the building structure, and is based on the document 'Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury – Part 2 Evaluation Procedure' (draft) issued by the Engineering Advisory Group (EAG) on 19 July 2011.

A quantitative assessment involves analytical calculations of the building's strength and may involve material testing, geotechnical testing and intrusive investigation.

The purpose of the assessment is to determine the likely building performance and damage patterns, to identify any potential Critical Structural Weaknesses (CSW) or collapse hazards, and to make an assessment of the likely building strength in terms of percentage of New Building Standard (%NBS).

Partial architectural drawings were made available which have been used in our assessment of the building. The original construction date is unknown. There were some refurbishments to date including installing a new ceiling in 1970, a new toilet block at the rear of the site, later demolished around 1996, and removal and replacement of the original timber match wall lining with plasterboard lining. There is potentially other refurbishment to the building which is not informed. The building description below is based on a review of the drawings and our visual inspections.

The format and content of this report follows a template provided by CCC, which is based on the EAG document.

2 Compliance

This section contains a brief summary of the requirements of the various statutes and authorities that control activities in relation to buildings in Christchurch at present.

2.1 Canterbury Earthquake Recovery Authority (CERA)

CERA was established on 28 March 2011 to take control of the recovery of Christchurch using powers established by the Canterbury Earthquake Recovery Act enacted on 18 April 2011. This act gives the Chief Executive Officer of CERA wide powers in relation to building safety, demolition and repair. Two relevant sections are:

Section 38 – Works

This section outlines a process in which the chief executive can give notice that a building is to be demolished and if the owner does not carry out the demolition, the chief executive can commission the demolition and recover the costs from the owner or by placing a charge on the owners' land.

Section 51 – Requiring Structural Survey

This section enables the chief executive to require a building owner, insurer or mortgagee carry out a full structural survey before the building is re-occupied.

We understand that CERA will require a detailed engineering evaluation to be carried out for all buildings (other than those exempt from the Earthquake Prone Building definition in the Building Act). It is understood that CERA is adopting the Detailed Engineering Evaluation Procedure document (draft) issued by the Engineering Advisory Group on 19 July 2011, which sets out a methodology for both qualitative and quantitative assessments. We understand this report will be used in response to CERA Section 51.

The qualitative assessment includes a thorough visual inspection of the building coupled with a desktop review of available documentation such as drawings, specifications and IEP's. The quantitative assessment involves analytical calculation of the building's strength and may require non-destructive or destructive material testing, geotechnical testing and intrusive investigation.

It is anticipated that factors determining the extent of evaluation and strengthening level required will include:

- The importance level and occupancy of the building
- The placard status that was assigned during the state of emergency following the 22 February 2011 earthquake
- The age and structural type of the building
- Consideration of any Critical Structural Weaknesses
- The extent of any earthquake damage

2.2 Building Act

Several sections of the Building Act are relevant when considering structural requirements:

Section 112 – Alterations

This section requires that an existing building complies with the relevant sections of the Building Code to at least the extent that it did prior to any alteration. This effectively means that a building cannot be weakened as a result of an alteration (including partial demolition).

Section 115 – Change of Use

This section requires that the territorial authority (in this case Christchurch City Council (CCC)) be satisfied that the building with a new use complies with the relevant sections of the Building Code 'as near as is reasonably practicable'. Regarding seismic capacity 'as near as reasonably practicable' has previously been interpreted by CCC as achieving a minimum of 67%NBS however where practical achieving 100%NBS is desirable. The New Zealand Society for Earthquake Engineering (NZSEE) recommend a minimum of 67%NBS.

Section 121 – Dangerous Buildings

The definition of dangerous building in the Act was extended by the Canterbury Earthquake (Building Act) Order 2010, and it now defines a building as dangerous if:

- In the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause injury or death or damage to other property; or
- In the event of fire, injury or death to any persons in the building or on other property is likely because of fire hazard or the occupancy of the building; or
- There is a risk that the building could collapse or otherwise cause injury or death as a result of earthquake shaking that is less than a 'moderate earthquake' (refer to Section 122 below); or
- There is a risk that that other property could collapse or otherwise cause injury or death; or

- A territorial authority has not been able to undertake an inspection to determine whether the building is dangerous.

Section 122 – Earthquake Prone Buildings

This section defines a building as earthquake prone if its ultimate capacity would be exceeded in a ‘moderate earthquake’ and it would be likely to collapse causing injury or death, or damage to other property. A moderate earthquake is defined by the building regulations as one that would generate ground shaking 33% of the shaking used to design an equivalent new building.

Section 124 – Powers of Territorial Authorities

This section gives the territorial authority the power to require strengthening work within specified timeframes or to close and prevent occupancy to any building defined as dangerous or earthquake prone.

Section 131 – Earthquake Prone Building Policy

This section requires the territorial authority to adopt a specific policy for earthquake prone, dangerous and insanitary buildings.

2.3 Christchurch City Council Policy

Christchurch City Council adopted their Earthquake Prone, Dangerous and Insanitary Building Policy in 2006. This policy was amended immediately following the Darfield Earthquake of the 4th September 2010.

The 2010 amendment includes the following:

- A process for identifying, categorising and prioritising Earthquake Prone Buildings, commencing on 1 July 2012;
- A strengthening target level of 67% of a new building for buildings that are Earthquake Prone;
- A timeframe of 15-30 years for Earthquake Prone Buildings to be strengthened; and,
- Repair works for buildings damaged by earthquakes will be required to comply with the above.

The council has stated their willingness to consider retrofit proposals on a case by case basis, considering the economic impact of such a retrofit.

It is understood that any building with a capacity of less than 33%NBS (including consideration of Critical Structural Weaknesses) will need to be strengthened to a target of 67%NBS of new building standard as recommended by the Policy.

If strengthening works are undertaken, a building consent will be required. A requirement of the consent will require upgrade of the building to comply ‘as near as is reasonably practicable’ with:

- The accessibility requirements of the Building Code.
- The fire requirements of the Building Code. This is likely to require a fire report to be submitted with the building consent application.

2.4 Building Code

The building code outlines performance standards for buildings and the Building Act requires that all new buildings comply with this code. Compliance Documents published by The Department of Building and Housing can be used to demonstrate compliance with the Building Code.

On 19 May 2011, Compliance Document B1: Structure was amended to include increased seismic design requirements for Canterbury as follows:

a. Hazard Factor increased from 0.22 to 0.3 (36% increase in the basic seismic design load)

b. Serviceability Return Period Factor increased from 0.25 to 0.33 (80% increase in the serviceability design loads when combined with the Hazard Factor increase)

The increase in the above factors has resulted in a reduction in the level of compliance of an existing building relative to a new building despite the capacity of the existing building not changing.

3 Earthquake Resistance Standards

For this assessment, the building's Ultimate Limit State earthquake resistance is compared with the current New Zealand Building Code requirements for a new building constructed on the site. This is expressed as a percentage of new building standard (%NBS). The new building standard load requirements have been determined in accordance with the current earthquake loading standard (NZS 1170.5:2004 Structural design actions - Earthquake actions - New Zealand).

No consideration has been given at this stage to checking the level of compliance against the increased Serviceability Limit State requirements.

The likely ultimate capacity of this building has been derived in accordance with the New Zealand Society for Earthquake Engineering (NZSEE) guidelines 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006. These guidelines provide an Initial Evaluation Procedure that assesses a building's capacity based on a comparison of loading codes from when the building was designed and currently. It is a quick high-level procedure that can be used when undertaking a Qualitative analysis of a building. The guidelines also provide guidance on calculating a modified Ultimate Limit State capacity of the building which is much more accurate and can be used when undertaking a Quantitative analysis.

The New Zealand Society for Earthquake Engineering has proposed a way for classifying earthquake risk for existing buildings in terms of %NBS and this is shown in Figure 3.1 below.

Description	Grade	Risk	%NBS	Existing Building Structural Performance	Improvement of Structural Performance	
					Legal Requirement	NZSEE Recommendation
Low Risk Building	A or B	Low	Above 67	Acceptable (improvement may be desirable)	The Building Act sets no required level of structural improvement (unless change in use) This is for each TA to decide. Improvement is not limited to 34%NBS.	100%NBS desirable. Improvement should achieve at least 67%NBS
Moderate Risk Building	B or C	Moderate	34 to 66	Acceptable legally. Improvement recommended		Not recommended. Acceptable only in exceptional circumstances
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement	Unacceptable	Unacceptable

Figure 3.1: NZSEE Risk Classifications Extracted from Table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table 3.1 below compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% risk of exceedance in 50 years (i.e. on average 0.2% in any year). It is noted that the current seismic risk in Christchurch results in a 6% risk of exceedance in the next year.

Table 3.1: %NBS Compared to Relative Risk of Failure

Building Grade	Percentage of New Building Standard (*%NBS*)	Approx. Risk Relative to a New Building
A+	>100	<1
A	80-100	1-2 times
B	67-80	2-5 times
C	33-67	5-10 times
D	20-33	10-25 times
E	<20	>25 times

4 Building Description

4.1 General

Summary information about the building is given in the following table.

Table 4.1: Building Summary Information

Item	Details	Comment
Building name	Harewood Community Centre	
Street Address	709 Harewood Road Harewood Christchurch	
Age	1935-1965 construction is assumed.	Partial architectural drawings available, the construction date is assumed between 1935 and 1965 based on historic aerial photographs. The date of extension design is unknown.
Description	Single storey timber construction	
Building Footprint / Floor Area	Approx. 195m^2 internally	
No. of storeys / basements	1 storey / no basement	
Occupancy / use	Childcare	Importance Level 2 assumed based on an assumed day care facility with a capacity less than 150 people.
Construction	Timber construction	
Gravity load resisting system	Timber trusses with timber internal and external walls.	Partial architectural drawings available. The timber walls are lined with plasterboard.
Seismic load resisting system	Timber walls with plasterboard linings in both directions. There is a hall with higher roof between north and south wings which are lower. The vertical walls between the hall and the north	

Item	Details	Comment
	and south wings transfer the load from the hall roof to the north and south wings. The ceiling of hall area is pinex acoustic tile.	
Foundation system	Concrete foundation wall at the perimeter of the building was observed with suspended timber floor and internal piles. The connection between timber framed wall and foundation wall is unknown.	
Stair system	Not applicable	
Other notable features	Large open hall in centre of building between north and south wings, with no internal columns or walls	
External works		
Construction information	None	No drawings available
Likely design standard	NZSS 1900, Chapter 8	Inferred from assumed age of building.
Heritage status	No heritage status	
Other		

4.2 Structural 'Hot-spots'

- Roof diaphragm connection to the main structure especially between the main hall and the north and south wings.
- Connection between the timber wall and foundation.

5 Site Investigations

5.1 Previous Assessments

We have no previous Level 1 or Level 2 assessment for this building. No historical reports or calculations relating to this structure were available.

5.2 Level 5 Intrusive Investigations

No intrusive investigation has been carried out at this stage. We recommend intrusive investigation to confirm assumptions made in our calculations such as actual wall construction, type and condition of wall linings, type of existing foundations, connection and existing diaphragms (Refer Appendix D).

6 Damage Assessment

6.1 Damage Summary

The table below provides a summary of damage observed during our inspection. Refer to Appendix A for photographs of the observed damage.

Table 6.1: Damage Summary

Damage type	Unknown	Minor	Moderate	Major	Comment
settlement of foundations			✓		There is typical minor cracking to perimeter foundation walls with one location with 15mm wide cracking and minor spalling. Level survey may be required to confirm.
tilt of building	✓				None observed during visual inspection.
liquefaction	✓				The aerial reconnaissance photograph from 24^{th} Feb 2011 indicates there was no liquefaction in this area.
settlement of external ground	✓				None observed during visual inspection.
lateral spread / ground cracks	✓				None observed during visual inspection.
Frame damage	✓				The timber roof trusses were not fully visible due to the presence of ceiling.
concrete walls damage					Not applicable
cracking to concrete floors					Not applicable
Bracing damage		✓			There is minor cracking to wall lining as the brace element with leaking stain at southern side of the building.
precast flooring seating damage					Not applicable
stairs					Not applicable
cladding /envelope	✓				No damage observed during visual inspection.
internal fit out		✓			Minor cracking to wall lining with leaking stain at southern side of the building.
building services	✓				No inspections of services were carried out.
other					

6.2 Surrounding Buildings

There are no adjacent buildings that are close enough that may affect this building during an earthquake.

6.3 Residual Displacements and General Observations

Some residual displacement and general ground movement were observed during our visual inspection. A global settlement survey may reveal movement that could be described as damage under insurance entitlement.

6.4 Implication of Damage

The structure has suffered typically minor structural damage and therefore we believe the structural capacity is not significantly diminished.

7 Generic Issues

The Harewood Community Centre is of timber frame construction. None of the generic issues referred to in Appendix A of the EAG guideline document are applicable to the form of timber construction.

8 Geotechnical Consideration

No geotechnical information is currently available for this site. Cracking to foundation walls indicate settlement.

9 Survey

No level or verticality surveys were carried out during the inspection. CCC may wish to undertake a level survey as part of insurance entitlement considerations.

10 Detailed Seismic Capacity Assessment

10.1 Assessment Methodology

The building has had its seismic capacity assessed using the Detailed Assessment Procedures in the NZSEE 2006 AISPBE guidelines, based on the drawings and site measurements undertaken.

The structure has suffered minor damage. No significant reduction from the undamaged assessed capacity.

10.2 Assumptions

The following assumptions were used in our quantitative assessment:

- The vertical walls between the hall and the north and south wings are acting as a diaphragm transferring the load from the hall roof to the north and south wings.
- The capacity of wall lining is 50% of modern GIB plasterboard capacity.

10.3 Critical Structural Weaknesses

The lateral resistance in transverse direction considered to be deficient with limited load paths on the large hall area to transfer lateral loads to the foundations.

10.4 Seismic Parameters

The seismic design parameters based on current design requirements from NZS 1170:2004 and the NZBC clause B1 for this building are:

- Site soil class: D – NZS 1170.5:2004, Clause 3.1.3, Soft Soil
- Site hazard factor, Z = 0.3 – NZBC, Clause B1 Structure, Amendment 11 effective from 19 May 2011
- Return period factor Ru = 1 and Rs = 0.33 – NZS 1170.5:2004, Table 3.5, Importance Level 2 structure with a 50 year design life.
- Near fault factor N(T,D) = 1 – NZS 1170.5:2004, Clause 3.1.6, Distance more than 20 km from fault line.

10.5 Results of Seismic Assessment

The results of our quantitative assessment indicate the building has a seismic capacity in the order of 6%NBS. Table 10.1 presents the evaluated seismic capacity in terms of %NBS of the structural systems in each building direction.

Table 10.1: Summary of Seismic Assessment of Structural Systems

Item	Direction	Ductility, μ	Seismic Performance	Notes
Timber frame walls with plasterboard lining	Longitudinal	2	27%NBS	NZS 3604:2011
Timber frame walls with plasterboard lining	Transverse	2	6%NBS	NZS 3604:2011

10.6 Discussion of results

The key findings of the assessment are as follows:

- The bracing line spacing in transverse direction is more than 6m. This does not comply with NZS 3604 requirement. Therefore a rigid diaphragm is required to restraint the bracing line.
- There are insufficient walls in the transverse direction of the large hall area to transfer loads to the foundations.
- The failure mechanism is considered to be non-brittle.

Based on the results of our Quantitative Assessment, the Harewood Community Centre is considered Earthquake Prone and Seismic Grade E as the seismic capacity was assessed to be lower than 33%NBS.

11 Recommendations

11.1 Occupancy

In order that the owner can make an informed decision about the on-going use and occupancy of their building the following information is presented in line with the Department of Building and Housing document 'Guidance for engineers assessing the seismic performance of non-residential and multi-unit residential buildings in greater Christchurch', June 2012.

The building is considered to be earthquake prone, having an assessed capacity less than 33%NBS. The risk of collapse of an earthquake prone building of this grade is considered to be more than 25 times greater than that of an equivalent new building.

For greater Christchurch the definition of “dangerous” building in the Building Act has been extended (by the Canterbury Earthquake (Building Act) Order 2011) to include buildings at risk of collapsing in a moderate earthquake, that is earthquake prone buildings with a capacity at or below 33%NBS. Where council requires a dangerous building or an earthquake prone building to be upgraded, it may prohibit the use of the building until the works are carried out.

No significant damage or hazards were identified to the seismic or gravity load resisting system that would further reduce its ability to resist further loads.

11.2 Further Investigations, Survey or Geotechnical Work

It is recommended that:

- Further efforts are made to obtain structural drawings.
- A level survey could be carried out to determine the extent of settlement of the building for insurance purposes.
- The assessment is based on some significant assumptions; further investigations are required to confirm capacity.

11.3 Damage Reinstatement

Repairs that would bring the building back to an “as new” condition are typically entitled under typical replacement insurance policies. We suggest you consult with your insurance advisor as to how you wish to proceed.

12 Design Features Report

Repairs will likely be required to reinstate the existing structural system and no additional load paths are expected as a result of the suggested remedial work.

13 Limitations

The following limitations apply to this engagement:

- Beca and its employees and agents are not able to give any warranty or guarantee that all defects, damage, conditions or qualities have been identified.
- Inspections are primarily limited to visible structural components. Appropriate locations for invasive inspection, if required, will be based on damage patterns observed in visible elements, and review of the construction drawings and structural system. As such, there will be concealed structural elements that will not be directly inspected.
- The inspections are limited to building structural components only.
- Inspection of building services, pipework, pavement, and fire safety systems is excluded from the scope of this report.
- Inspection of the glazing system, linings, carpets, claddings, finishes, suspended ceilings, partitions, tenant fit-out, or the general water tightness envelope is excluded from the scope of this report.
- The preliminary assessment of the lateral load capacity of the building is limited by the completeness and accuracy of the drawings provided. Assumptions have been made in respect

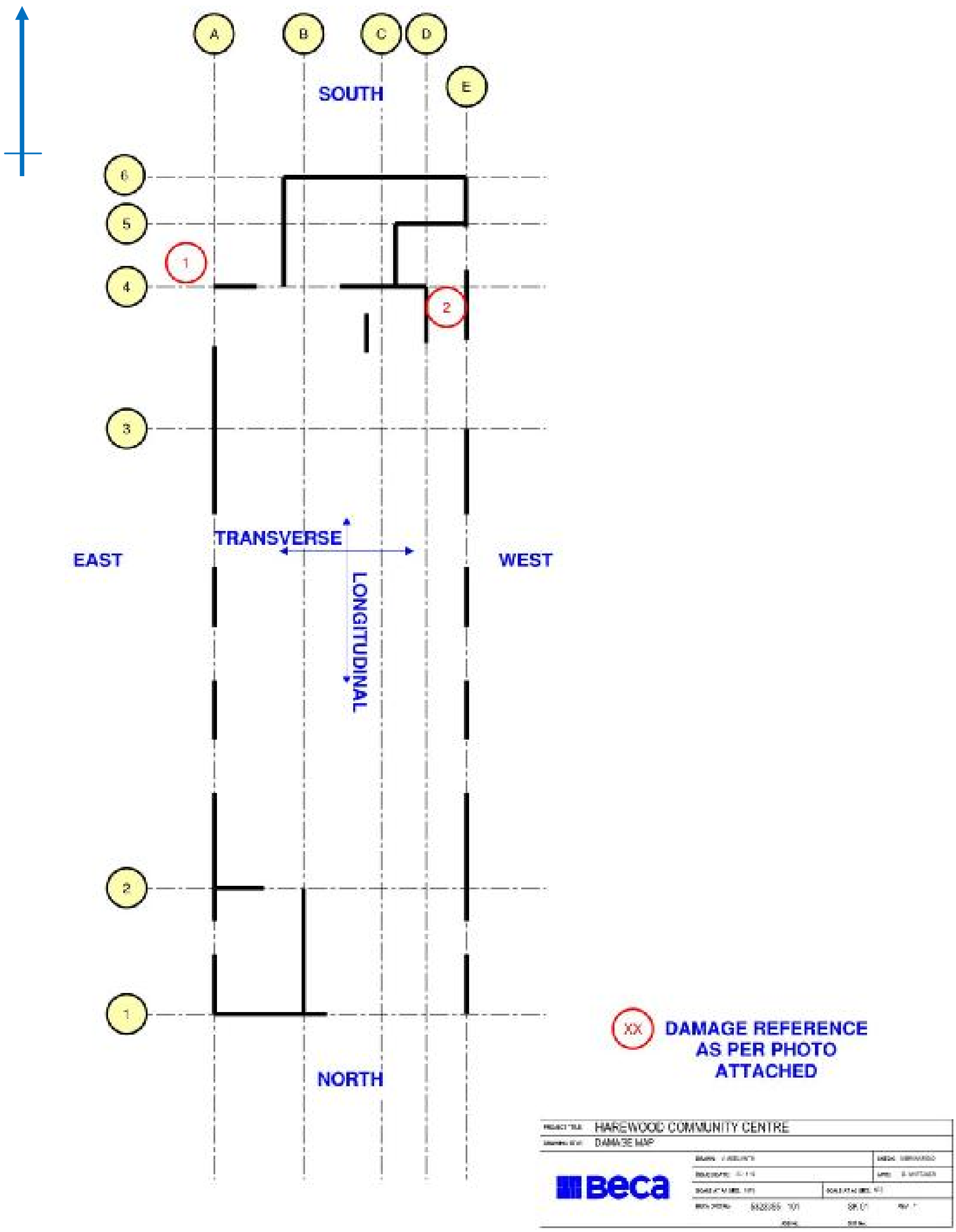
of the geotechnical conditions at the site and any aspects or material properties not clear on the drawings. Where these assumptions are considered material to the outcome further investigations may be recommended. It is noted the assessment has not been exhaustive, our analysis and calculations have focused on representative areas only to determine the level of provision made. At this stage we have not undertaken any checks of the gravity system, wind load capacity, or foundations.

- The information in this report provides a snapshot of building damage at the time the detailed inspection was carried out. Additional inspections required as a result of significant aftershocks are outside the scope of this work.

This report is of defined scope and is for reliance by CCC only, and only for this commission. Beca should be consulted where any question regarding the interpretation or completeness of our inspection or reporting arises.

Appendix A

Photographs



Key Plan of Building

Photo 1: Cracking and spalling to foundation wall

Damage description: Cracking and spalling to concrete foundation wall at the southeast corner of the building with cracking width approximately 15mm.

Photo 2: Cracking to wall lining with leaking stain

Damage description: Cracking to wall lining with leaking stain at the south end of the building.

Appendix B

CERA DEE Summary Data

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Harewood Community Centre
Building Address:	Unit: No: 709 Street: Harewood Road
Legal Description:	BU 0299-001 EQ2
GPS south:	Degrees / Min / Sec
GPS east:	
Building Unique Identifier (CCC):	
Reviewer:	David Whittaker
CPEng No:	123089
Company:	Beca
Company project number:	5323355
Company phone number:	03 366 3521
Date of submission:	
Inspection Date:	26/09/2012
Revision:	B
Is there a full report with this summary?	yes

Site

Site slope:	flat
Soil type:	
Site Class (to NZS1170.5):	D
Proximity to waterway (m, if <100m):	
Proximity to clifftop (m, if < 100m):	
Proximity to cliff base (m,if <100m):	
Max retaining height (m):	
Soil Profile (if available):	Unknown, no geotechnical report available
If Ground improvement on site, describe:	None
Approx site elevation (m):	

Building

No. of storeys above ground:	1 (single storey = 1)
Ground floor split?	no
Storeys below ground	0
Foundation type:	other (describe)
Building height (m):	6.00
Floor footprint area (approx):	195
Age of Building (years):	52
Ground floor elevation (Absolute) (m):	
Ground floor elevation above ground (m):	0.40
if Foundation type is other, describe:	Foundation wall
height from ground to level of uppermost seismic mass (for IEP only) (m):	4m eaves and 8m apex for hall area
Date of design:	1935-1965
Strengthening present?	no
If so, when (year)?	
And what load level (%g)?	
Brief strengthening description:	
Use (ground floor):	other (specify)
Use (upper floors):	
Use notes (if required):	Childcare
Importance level (to NZS1170.5):	IL2

Gravity Structure

Gravity System:	load bearing walls		
Roof:	timber truss	truss depth, purlin type and cladding	Timber purlin
Floors:	timber	joist depth and spacing (mm)	Unknown
Beams:	timber	type	
Columns:			
Walls:			

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	other (note)	describe system	Timber walls with plasterboard lining
Ductility assumed, μ:	2.00		
Period along:	0.40 (0.00)	estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	
Lateral system across:	other (note)	describe system	Timber walls with plasterboard lining
Ductility assumed, μ:	2.00		
Period across:	0.40 (0.00)	estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	

Separations: (leave blank if not relevant)

north (mm):	
east (mm):	
south (mm):	
west (mm):	

Non-structural elements

Stairs:	other (specify)	describe	No stair
Wall cladding:	other light	describe	Weatherboard
Roof Cladding:	Metal	describe	
Glazing:	timber frames		
Ceilings:	plaster, fixed		
Services(list):			

Available documentation

Architectural	partial	original designer name/date	Waimairi County Council/1970
Structural	none	original designer name/date	
Mechanical	none	original designer name/date	
Electrical	none	original designer name/date	
Geotech report	none	original designer name/date	

Damage

Site: (refer DEE Table 4-2)

Site performance:		Describe damage:	
Settlement:	none observed	notes (if applicable):	Geotechnical report is required to confirm
Differential settlement:	none observed	notes (if applicable):	Geotechnical report is required to confirm
Liquefaction:	none apparent	notes (if applicable):	Geotechnical report is required to confirm
Lateral Spread:	none apparent	notes (if applicable):	Geotechnical report is required to confirm
Differential lateral spread:	none apparent	notes (if applicable):	Geotechnical report is required to confirm
Ground cracks:	none apparent	notes (if applicable):	Geotechnical report is required to confirm
Damage to area:	none apparent	notes (if applicable):	

Building:

	Current Placard Status:	green		
Along	Damage ratio:	0%	Describe how damage ratio arrived at:	
	Describe (summary):			
Across	Damage ratio:	0%		
	Describe (summary):			
Diaphragms	Damage?:	no	Describe:	
CSWs:	Damage?:	no	Describe:	
Pounding:	Damage?:	no	Describe:	
Non-structural:	Damage?:	no	Describe:	

$$Damage\_Ratio = \frac{(\%NBS(before) - \%NBS(after))}{\%NBS(before)}$$

Recommendations

Level of repair/strengthening required:	significant structural and strengthening	Describe:	
Building Consent required:	yes	Describe:	
Interim occupancy recommendations:		Describe:	Refer CCC Policy for EQ prone buildings

Along	Assessed %NBS before:	27%	0% %NBS from IEP below	If IEP not used, please detail assessment methodology: Hand calculation of brace capacities to main resisting eler
	Assessed %NBS after:	27%		
Across	Assessed %NBS before:	6%	0% %NBS from IEP below	
	Assessed %NBS after:	6%		

IEP — **Use of this method is not mandatory - more detailed analysis may give a different answer, which would take precedence. Do not fill in fields if not using IEP.**

Period of design of building (from above): 1935-1965

h_n from above: 4m eaves and 8m apex for hall aream

Seismic Zone, if designed between 1965 and 1992:

not required for this age of building
not required for this age of building

	along	across
Period (from above):	0.4	0.4
(%NBS)nom from Fig 3.3:		

Note:1 for specifically design public buildings, to the code of the day: pre-1965 = 1.25; 1965-1976, Zone A =1.33; 1965-1976, Zone B = 1.2; all else 1.0
Note 2: for RC buildings designed between 1976-1984, use 1.2
Note 3: for buildngs designed prior to 1935 use 0.8, except in Wellington (1.0)

	along	across
Final (%NBS)nom:	**0%**	**0%**

2.2 Near Fault Scaling Factor

Near Fault scaling factor, from NZS1170.5, cl 3.1.6: 1.00

	along	across
Near Fault scaling factor (1/N(T,D), **Factor A**:	1	1

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3: 0.30
Z_{1992}, from NZS4203:1992: 1.0
Hazard scaling factor, **Factor B:** 3.333333333

2.4 Return Period Scaling Factor

Building Importance level (from above): 2
Return Period Scaling factor from Table 3.1, **Factor C**: 1.00

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)	2.00	2.00
Ductility scaling factor: =1 from 1976 onwards; or =kμ, if pre-1976, fromTable 3.3:	1.57	1.57
Ductiity Scaling Factor, **Factor D**:	1.57	1.57

2.6 Structural Performance Scaling Factor:

	along	across
Sp:	0.700	0.700
Structural Performance Scaling Factor **Factor E**:	1.428571429	1.428571429

2.7 Baseline %NBS, (NBS%)b = (%NBS)nom x A x B x C x D x E

	along	across
%NBSb:	**0%**	**0%**

Global Critical Structural Weaknesses: (refer to NZSEE IEP Table 3.4)

3.1. Plan Irregularity, factor A:	insignificant	1
3.2. Vertical irregularity, Factor B:	insignificant	1
3.3. Short columns, Factor C:	insignificant	1
3.4. Pounding potential — Pounding effect D1, from Table to right		1.0
Height Difference effect D2, from Table to right		1.0
Therefore, Factor D:		1
3.5. Site Characteristics	insignificant	1

Table for selection of D1	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H
Alignment of floors within 20% of H	**0.7**	**0.8**	**1**
Alignment of floors not within 20% of H	**0.4**	**0.7**	**0.8**

Table for Selection of D2	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H
Height difference > 4 storeys	0.4	0.7	1
Height difference 2 to 4 storeys	0.7	0.9	1
Height difference < 2 storeys	1	1	1

3.6. Other factors, Factor F

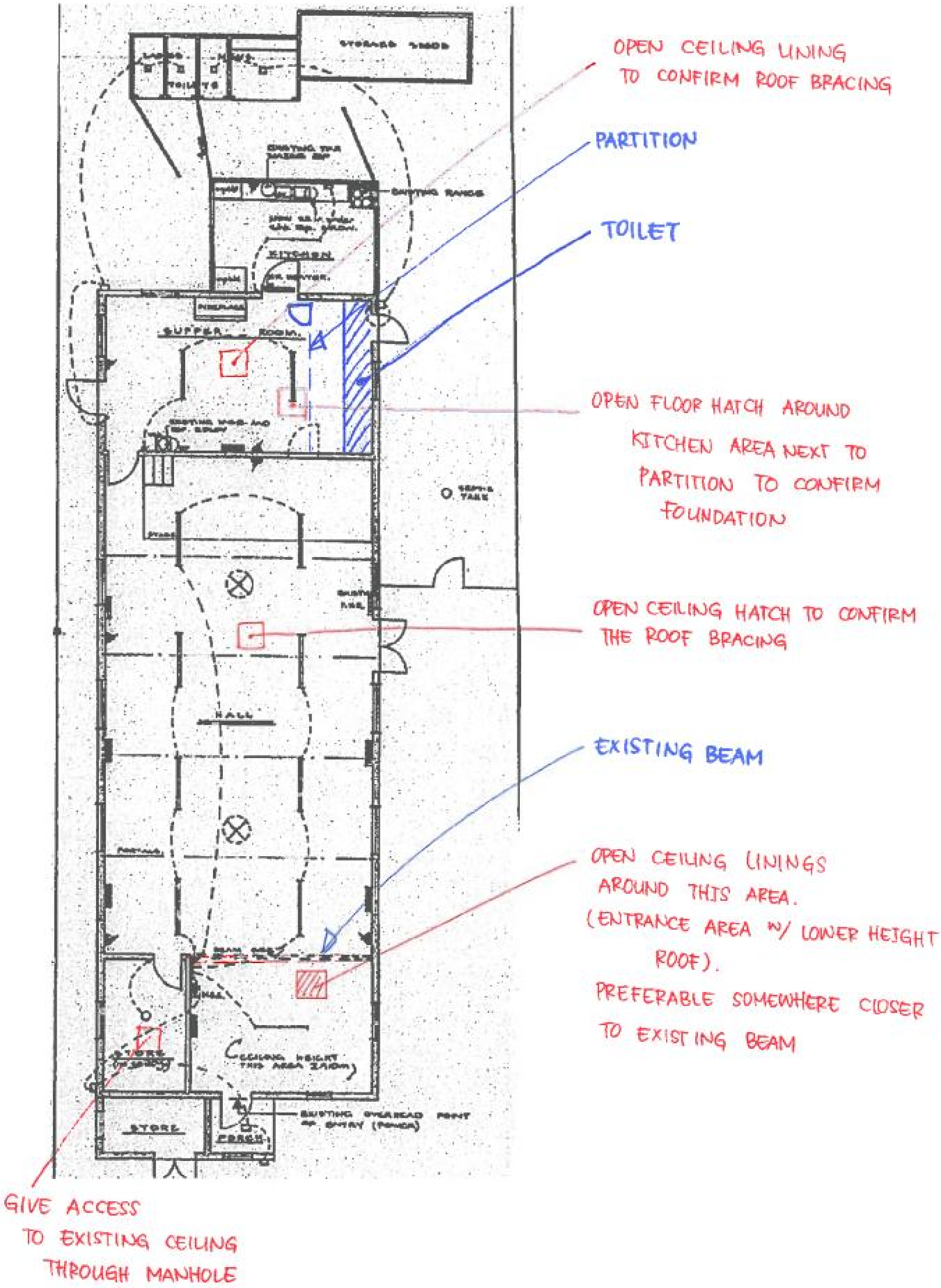
	Along	Across
For ≤ 3 storeys, max value =2.5, otherwise max value =1.5, no minimum		
Rationale for choice of F factor, if not 1		

Detail Critical Structural Weaknesses: (refer to DEE Procedure section 6)
List any: Refer also section 6.3.1 of DEE for discussion of F factor modification for other critical structural weaknesses

	along	across
3.7. Overall Performance Achievement ratio (PAR)	**0.00**	**0.00**
4.3 PAR x (%NBS)b: PAR x Baselline %NBS:	**0%**	**0%**
4.4 Percentage New Building Standard (%NBS), (before)		**0%**

Appendix C

Proposed Intrusive Investigation


OPEN CEILING LINING TO CONFIRM ROOF BRACING
PARTITION
TOILET
OPEN FLOOR HATCH AROUND KITCHEN AREA NEXT TO PARTITION TO CONFIRM FOUNDATION
OPEN CEILING HATCH TO CONFIRM THE ROOF BRACING
EXISTING BEAM
OPEN CEILING LININGS AROUND THIS AREA. (ENTRANCE AREA W/ LOWER HEIGHT ROOF). PREFERABLE SOMEWHERE CLOSER TO EXISTING BEAM
GIVE ACCESS TO EXISTING CEILING THROUGH MANHOLE
STORAGE SHED
KITCHEN
SUPPER ROOM
HALL
STORE
PORCH